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(72) Inventors JAMES LAURENCE BACON
ROY BUCKINGHAM
JOHN SCOTT EAGLE
RODNEY CLIVE FELTHAM
PERCIVAL JOHN SHAVE

(19)

(54) IMPROVEMENTS IN OR RELATING TO ELECTRIC IRONS

(71) We, BRITISH DOMESTIC APPLIANCES LIMITED, of Peterborough, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to electric irons of the kind incorporating means for generating steam, and for directing the steam on to the surface of the material being ironed, such irons being known generally as steam irons and will hereinafter be referred to as such.

According to the present invention an electric steam iron of the kind referred to is provided with a composite sole plate consisting of a support member to the base of which is secured a detachable facing plate at least the outer surface of which is smooth and relatively scratch resistant, and retaining means engageable with a co-operating surface at the periphery of an aperture through the facing plate for detachably clamping the latter to the support member, which retaining means is provided with at least one opening for the passage of steam from the steam generating means.

Preferably the retaining means incorporates a member providing part of the wall of a steam generating chamber, heatable by the main heating element of the iron or a separate heating element, and into which water can be introduced at a controlled rate from a reservoir located above the support member, the member being provided with a said opening or openings for the passage of steam from the steam generating chamber.

Preferably also the facing plate consists of a heat resistant glass or a glass ceramic material, the provision of the steam passages through the retaining means and the manner of securing the plate to the support member enabling a relatively simple design of facing plate to be employed, an important consideration in view of the difficulties involved in producing intricate glass mouldings, and especially since an intricately designed moulding is more subject to fracture in use due to local stressing of the material.

Moreover, clamping the facing plate to the support member at a single region only, ensures freedom for the plate to expand or contract across the support member during heating and cooling of the iron so that the setting up of excessive stresses in the plate is avoided.

However there may be provided at one or more other regions additional retaining means for clamping the facing plate to the member, so as to ensure a good overall surface contact between them, and/or for preventing rotation of the facing plate relative to the support member. Such additional means are then preferably constructed in such a manner as to permit expansion and contraction of the facing plate about the main clamping position.

However the invention is not restricted to irons having facing plates of glass or glass ceramic material, and the facing plate can be of any other suitable material or materials provided with an operative surface of appropriate smoothness and hardness; in this connection it will be understood that the expression "relatively scratch resistant" used in the above statement of the invention means that the outer surface of the facing plate should be sufficiently hard to withstand damage during normal use of the iron; for example a steel plate having on its outer surface a vitreous enamel coating could alternatively be employed as the facing plate.

The use of a separate facing plate enables the part of the sole plate which accommodates the heating element and thermostat and to which the handle is attached, namely the support member, to be

[Price 33p]

formed from a readily castable metal such as aluminium or aluminium alloy which in view of its relative softness is not a particularly suitable material for providing the operative surface of the iron. Moreover should the operative surface become damaged in any way the use of a detachable facing plate enables it to be readily replaced. The use of a glass or glass ceramic facing plate is especially advantageous not only because of its inherent hardness, but due to its electrically insulating properties. Thus where the iron is also fitted with an insulating cowl and handle, all electrically live parts will be fully enclosed within an insulating outer casing.

It will, of course, be realized that the co-operating surface which is engageable with the retaining means should be so disposed that the retaining means is countersunk with respect to the operative surface of the facing plate.

The upper surface of the support member, that is to say the surface remote from the facng plate, may be grooved to accommodate a sheathed wire electric heating element. Alternatively the heating element may be accommodated in a groove in the lower surface of the support member.

Where the facing plate is of glass or glass ceramic material or other material of a transparent or translucent nature a lamp, energisable when the iron is switched on, may be arranged to illuminate at least a region of the facing plate from within the body of the iron if desired, one or more suitably positioned openings being provided in the support member for this purpose.

The steam chamber may be provided partly by a recess in a member mounted over an opening in the support member and incorporating a heating element separate from the main heating element of the iron, the mouth of the recess being closed by an apertured member forming part of the retaining means for the facing plate.

The periphery of the apertured member may be arranged to engage the co-operating surface on the facing plate directly or it may be arranged to secure an intermediate member which itself engages the co-operating surface and clamps the facing plate to to the support member. Steam may be arranged to pass directly from the steam generating member through the apertured member, in which case a baffle is preferably provided between the member and a steam outlet from the base of the iron to provide a tortuous path for the steam so as to ensure that any remaining water droplets in the steam are converted to steam before contacting the material being ironed.

However instead of the aperture or apertures in the member communicating directly with the steam generating chamber, said aperture or apertures may communicate with distribution chamber, which itself communicates with the steam generating chamber through at least one tortuous path. Such an arrangement is of particular advantage.

The retaining means may be shaped so as to provide with the support member a distribution chamber which communicates with the steam generating chamber, a plurality of outlet passages being provided through the retaining means from the distribution chamber for the passage of steam.

Preferably an annular groove on the upper surface of the retaining means co-operates with a further annular groove on the underside of the support member, when the retaining means is secured thereto, to provide a distribution chamber of annular shape, the outlet passages being preferably uniformly spaced around the annular distribution chamber.

The distribution chamber may be connected to the main steam generating chamber through a plurality of ducts, and in the preferred form of the invention the ducts communicate with an intermediate chamber which is connected to the main steam generating chamber through one or more further ducts.

A number of different forms of electric steam irons constructed in accordance with the invention will now be described, by way of example, with reference to Figures 1 to 7 of the accompanying schematic drawings, in which:

Figure 1 is a sectional view of the first iron showing chiefly the heating and steaming arrangements;

Figures 2 and 3 are sectional views of parts of two further steam irons similar to that illustrated in Figure 1 but having alternative heating arrangements;

Figure 4 is a view of the electric heater used in an iron according to Figure 2;

Figure 5 shows part of a modified form of the electric iron featured in Figure 1 in which a water container is formed by a moulded handle and a cowl with a closure plate;

Figure 6 is a sectional view of a further iron, and

Figure 7 is a plan view from below of this latter iron with the face plate removed for the sake of clarity.

Referring first to Figure 1 of the drawings, the electric steam iron illustrated therein comprises a combined handle and cowl 10 moulded from a suitable thermo-setting plastics material. Mounted within the cowl is a water container 11 supported locally above a steam generating chamber 12 formed partly by an enclosing casting 13 centrally surmounting an aperture in a cast aluminium support plate 14 against the underside of which is held a glass ceramic facing

plate 15. The support plate 14 and the facing plate 15 form the soleplate of the iron which is heated by means of a sheathed wire electric heating element 16 of D-shaped section pressed into a semi-circular groove 17. The enclosing casting 13 of the generating chamber 12 is provided with a separate sheathed heating element 12*a* cast integrally with it. The casting 13 carries a centrally disposed downwardly protruding boss 18 which has a threaded hole 19 into which a stud 21 is screwed. Arranged within the chamber is a double flanged ring 22, the outer flange 22*a* of which is located in a circular recess surrounding a hole 23 moulded in the glass ceramic facing plate 15. Mounted against a circular protruding rib 22*b* formed on the inside of the flanged ring is a circular domed washer 24 which with the casting 13 forms the steam generating chamber 12, and which in conjunction with a nut 25 allows the flanged ring and hence the facing plate 15 to be secured to the underside of the support plate. A standing pipe 24*a* is secured vertically in a wall of the washer 24. A locating arrangement (not shown) of any convenient form may be provided to ensure that the facing plate is located correctly in relation to the support plate. Apart from the securing arrangement described above, the facing plate is free to move, i.e. expand and contract across the support plate during heating and cooling of the iron. The stud 21 also carries a hollow internally threaded screw 26 which serves to secure a circular apertured plate 27 to the flanged ring 22. A circular disc 28 having a single aperture 29 is located between the plate 27 and the washer 24. A water drip valve 31 operated manually by the user by means of a, for example, push button mounted on the handle or cowl in any suitable manner, serves to regulate the flow of water from the container 11 into the steam generating chamber 12. A thermostat 33 (shown diagrammatically) is actuated by a bimetal member 34 secured to the support plate 14 in such a manner as to regulate the temperature of the steam generating chamber, and of the soleplate at appropriate levels. Variation of the temperature setting is accomplished by adjustment of a control knob 35 which is arranged to rotate the actuating spindle 36 of the thermostat 33.

In operation water is gravity fed from the container 11 via the valve 31 at a controlled rate into the chamber 12 where it is converted into steam by the surrounding heat. The steam passes through the standing pipe 24*a* into a secondary chamber 12*b* formed by the dome washer 24 and the disc 28 where any remaining water droplets are converted to steam. The steam then passes through the aperture 29 and leaves the iron via apertures in the plate 27.

The iron which is illustrated in part in Figure 2 is similar to that already described, and the same reference numerals have been employed. However in this arrangement the casting 13 of the previous embodiment forms an integral part of the support plate 14, the separate heating element 12*a* for the steam generating chamber being dispensed with, and a combined element 16*a* shaped in the manner shown in Figure 4, is provided to heat both the steam generating chamber and the soleplate. For this purpose the element is formed at its forward end with a looped portion 16*b* which surrounds the part 13 of the support plate, the groove in the upper surface of the plate being suitably shaped to accommodate the heating element. The iron which is illustrated in part in Figure 3 similarly has the casting 13 of the Figure 1 embodiment formed as an integral part of the support plate 14, and is provided with a combined heating element 16*a* similar in shape to that illustrated in Figure 4. However in this case the heating element is mounted in grooves formed in the underside of the support plate 14 so as to more directly provide heat for the adjacent facing plate 15.

Figure 5 shows an iron similar to that of Figure 1 with a heater 12*a* for the steam generating chamber 12 contained within a separate casting 13. This embodiment however, incorporates an alternative design of water container in which the walls of the container are formed by a combined moulding 10 which forms the handle and cowl assembly and an enclosing plate 41 appropriately fixed and sealed to the moulding.

Referring now to Figures 6 and 7 of the drawings, the electric steam iron illustrated therein similarly comprises a handle (not shown) and a cowl 10 surmounting a die-cast aluminium support plate 14 to the underside of which is attached a glass ceramic facing plate 15. In this arrangement however a die-cast aluminium closing plate 43 is mounted and sealed to the upper part of the support plate 14 by means of a gasket 43*a* and screws (not shown) so as to form with the support plate a steam generating chamber 12. The plate 43 also forms a closure member for a labyrinth of passages 45 leading from the chamber 12 to a number of vent holes 46. Each of the vent holes is linked by a semi-circular sectional groove 47 formed in the underside of the support plate to an annular groove 48. A sheathed heating element 16, of generally 'U' shaped form so as to conform to the shape of the support plate 14, is pressed and secured into a groove 17 in the upper surface of the support plate. The facing plate 15 is held against the

underside of the support plate by a circular retaining member 51 through which a fixing screw 52 passes, being secured in a tapped hole 53 formed in a downwardly protruding boss 43*b* formed in the closing plate 43. The retaining member 51 is sealed to the underside of the support plate by means of a silicon rubber "o" ring 54. The retaining member 51 has a sloping peripheral surface 51*a* which mates with a similar sloping surface formed around an aperture in the facing plate 15 so as to provide a seal. An annular semi-circular groove 55 formed around the periphery of the retaining member 51 forms with the groove 48 an annular chamber 56. Vent holes 57 lead from the chamber to the lower surface of the retaining member. The facing plate 15 is located with respect to the support plate 14 by means of a circular tapered projection 15*a* which engages in a hole 58 formed in the support plate 14 and which is sealed by means of a further silicon rubber "o" ring 59, the projection 15*a* also serving to prevent rotation of the facing plate relative to the support plate 14. A thin gasket (not shown) is fitted around the edges of the mating surfaces of the support and facing plates. A water container and an associated drip valve (not shown), it fitted within the cowl 10 above the support plate 14, the drip valve being mounted centrally within a ceramic bush 61 fitted in the closing plate 43 immediately above the steam generating chamber 12.

In operation, water drips at a controlled rate into the steam generating chamber 12 where it is "flashed off". The resulting steam passes through the labyrinth of passages 45 where it is dried i.e. any surplus moisture or water droplets are converted to steam by the surrounding heat. From the labyrinth the steam passes through the vent holes 46 and the grooves 47 into the annular steam distribution chamber 56 from where it escapes through further vent holes 57.

The invention enables a simple design of glass ceramic facing plate to be used, an important consideration in view of the difficulties involved in producing intricate glass mouldings.

However, although in each of the steam irons described and illustrated the operative part of the sole plate has been provided by a facing plate of glass ceramic material, it is to be understood that other facing plate materials or coatings, for example a steel plate having a vitreous enamel coating, could well provide a satisfactory alternative.

Moreover an additional means for securing the facing plate to the support plate 14 may be provided, if desired, to ensure that the whole of the adjacent surfaces of the plates are clamped together in good thermally conductive relationship.

The facing plate of any of the irons described may, for example, be provided along its centre line, in a region spaced from the main retaining means, with a slot having its major axis extending longitudinally and located within a depression formed in the lower surface of the plate, a screw passing through the slot into a co-operating tapped hole in the support plate to secure the facing plate to the support plate at that region; by employing a slot of suitable length, expansion and contraction of the facing plate relative to the support plate is permitted to take place about the main retaining means. A spring washer may be disposed beneath the head of the screw to urge the facing plate into resilient but firm contact with the support plate.

WHAT WE CLAIM IS:—

1. An electric steam iron comprising means for generating steam, means for directing the steam on to the surface of a material being ironed, a composite sole plate consisting of a support member to the base of which is secured a detachable facing plate at least the outer surface of which is smooth and relatively scratch resistant, and retaining means engageable with a co-operating surface at the periphery of an aperture through the facing plate for detachably clamping the latter to the support member, which retaining means is provided with at least one opening for the passage of steam from the steam generating means.

2. An electric steam iron according to Claim 1, wherein the retaining means incorporates a member providing part of the wall of a steam generating chamber, heatable by the main heating element of the iron or a separate heating element, and into which water can be introduced at a controlled rate from a reservoir located above the support member, the member being provided with a said opening or openings for the passage of steam from the steam generating chamber.

3. An electric steam iron according to Claim 1 or 2, wherein the steam chamber is provided partly by a recess in a member mounted over an opening in the support member and incorporating a heating element separate from the main heating element of the iron, the mouth of the recess being closed by an apertured member forming part of the retaining means for the facing plate.

4. An electric steam iron according to Claim 3, wherein the periphery of the apertured member engages the co-operating surface on the facing plate directly.

5. An electric steam iron according to Claim 3, wherein the periphery of the apertured member secures an intermediate member which itself engages the co-operat-

ing surface and clamps the facing plate to the support member.

6. An electric steam iron according to Claim 3, 4 or 5, incorporating at least one baffle between the apertured member and a steam outlet from the base of the iron to provide a tortuous path for the steam.

7. An electric steam iron according to Claim 1, wherein the retaining means is shaped so as to provide with the support member a distribution chamber which communicates with said steam generating chamber, a plurality of outlet passages being provided through the retaining means from the distribution chamber for the passage of steam.

8. An electric steam iron according to Claim 7, wherein an annular groove on an upper surface of the retaining means cooperates with a further annular groove on the underside of the support member, when the retaining means is secured thereto, to provide a distribution chamber of annular shape.

9. An electric steam iron according to Claim 8, wherein the outlet passages are substantially uniformly spaced around the annular distribution chamber.

10. An electric steam iron according to Claim 9, wherein the distribution chamber is connected to the steam generating chamber through a plurality of ducts, the ducts communicating with an intermediate chamber which is connected to the steam generating chamber through one or more further ducts.

11. An electric steam iron according to any preceding claim, wherein the facing plate consists of a heat resistant glass or a glass ceramic material.

12. An electric steam iron according to any one of Claims 1 to 10, wherein the facing plate comprises a steel plate having on its outer surface a vitreous enamel coating.

13. An electric steam iron according to any preceding Claim, wherein the support member comprises a casting of aluminium or aluminium alloy.

14. An electric steam iron according to any preceding Claim, wherein the upper surface of the support member is grooved to accommodate a sheathed wire electric heating element.

15. An electric steam iron according to any one of Claims 1 to 13, wherein the lower surface of the support member is grooved to accommodate a sheathed wire electric heating element.

16. An electric steam iron according to Claim 11, including within the body of the iron an electric lamp which is energisable when the iron is switched on and is arranged to illuminate at least a region of the facing plate.

17. An electric steam iron according to any preceding claim, having a water reservoir formed partly by a moulding forming a handle and cowl assembly of the iron and a plate sealed to the moulding.

18. An electric steam iron according to any preceding Claim including, at a region spaced from the said retaining means, additional retaining means for clamping the facing plate to the support member at said region.

19. An electric steam iron according to Claim 18, wherein the additional retaining means is such as to permit a degree of expansion and contraction of the facing plate relative to the support member to take place about the first said retaining means.

20. An electric steam iron substantially as shown in and as hereinbefore described with reference to Figure 1, Figures 2 and 4, Figure 3, Figure 5 or Figures 6 and 7 of the accompanying drawings.

For the Applicants,
H. V. A. KIRBY
Chartered Patent Agent.

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1380415 COMPLETE SPECIFICATION
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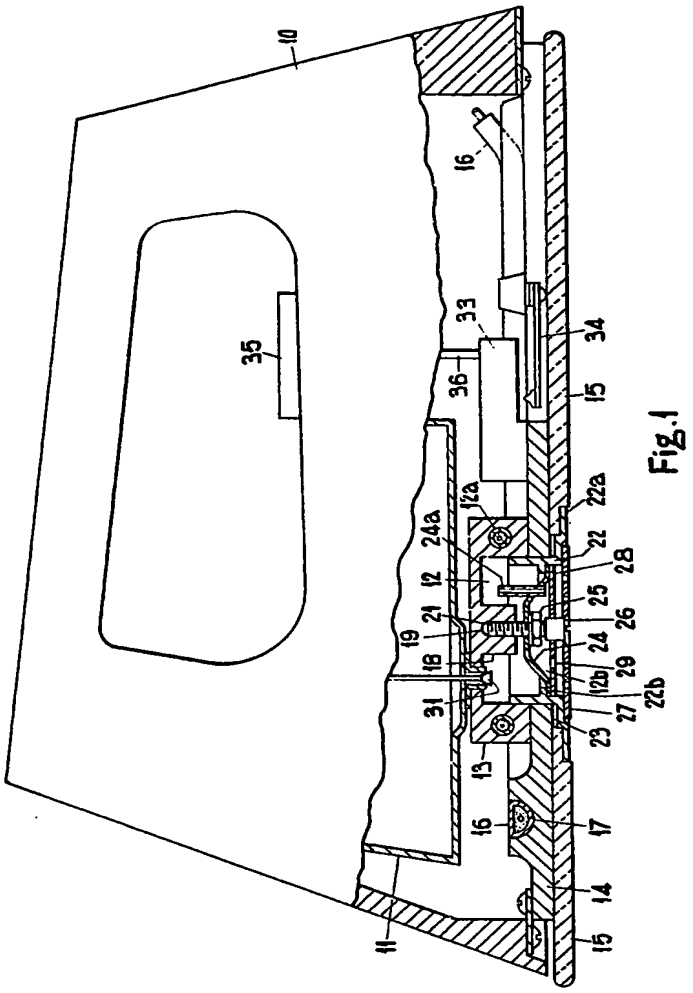

Fig.1

1380415 COMPLETE SPECIFICATION
4 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
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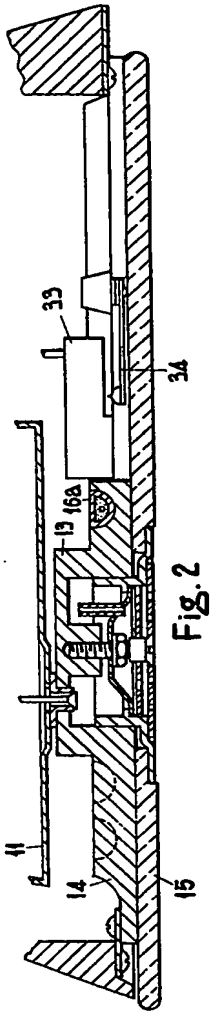

Fig. 2

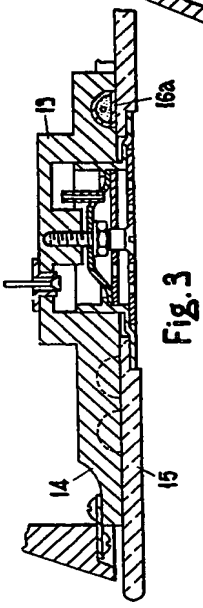

Fig. 3

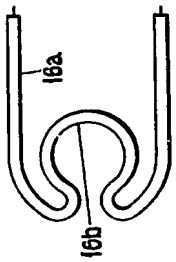

Fig. 4

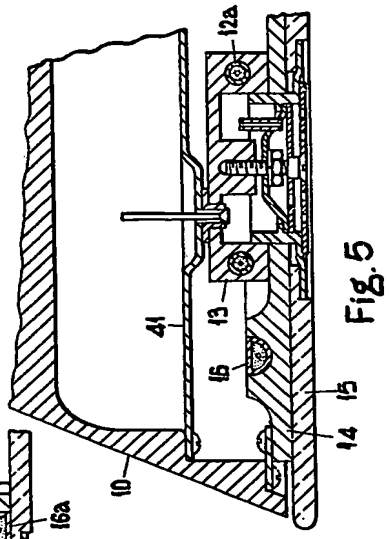

Fig. 5

1380415 COMPLETE SPECIFICATION

4 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 3

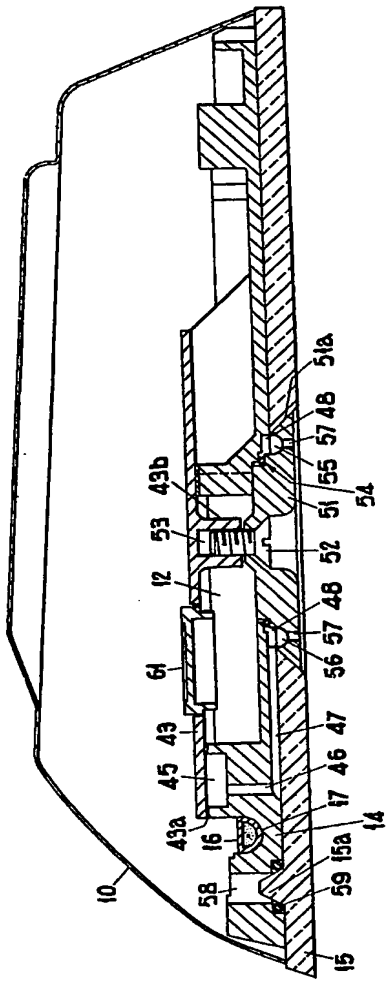

Fig.6

1380415 COMPLETE SPECIFICATION
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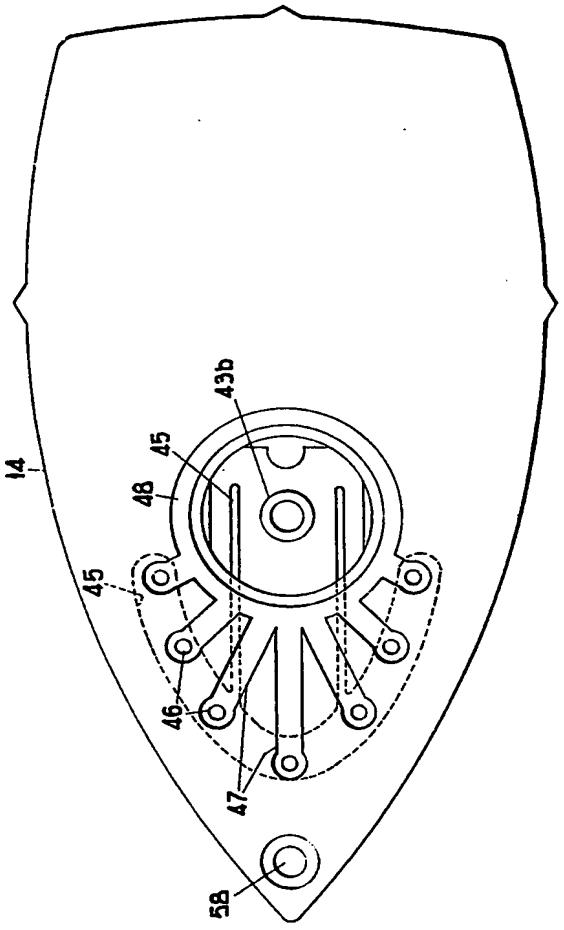

Fig.7